Health & Safety Report

Worker Health and Safety Branch

HS-1783

OVERVIEW OF THE CALIFORNIA PESTICIDE ILLNESS SURVEILLANCE PROGRAM
- 1997 -

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CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY
DEPARTMENT OF PESTICIDE REGULATION
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Pesticide Illness Surveillance Program - 1997

Background on the Reporting System

The California pesticide safety program, which the Department of Pesticide Regulation (DPR) administers, is widely regarded as the most stringent in the nation. It includes requirements for thorough data review of all pesticides[1] before registration for use in California, safety training of all pesticide handlers and field workers, and ongoing monitoring of people and the environment to detect potential for pesticide exposure. Mandatory reporting of pesticide illnesses has been part of this comprehensive program since 1971. The U.S. General Accounting Office (GAO, 1993) noted that "California had by far the most effective and well-established monitoring system in place" and that the U.S. Environmental Protection Agency (U.S. EPA) "relies heavily on the pesticide illness data collected by the California monitoring system ... and has tried to encourage selected states to develop monitoring systems modeled after the California system."

[1] "Pesticide" is used to describe many substances that control pests. Pests may be insects, fungi, weeds, rodents, nematodes, algae, viruses or bacteria -- almost any living organisms that cause damage or economic loss, or transmit or produce disease. Therefore, pesticides include herbicides, fungicides, insecticides, rodenticides, disinfectants, as well as insect growth regulators. In California, adjuvants are also subject to the regulations that control pesticides. Adjuvants are substances added to enhance the efficacy of a pesticide, and include emulsifiers, spreaders, and wetting and dispersing agents.

DPR staff participate in the working group convened by the National Institute of Occupational Health (NIOSH) to develop standards for collection of information on pesticide illnesses. NIOSH now partially supports programs in the states of Florida, New York, Oregon, and Texas, which attempt to implement the standards that the working group defined.

DPR maintains its surveillance of human health effects of pesticide exposure in order to evaluate the circumstances of pesticide exposures that result in illness. Staff regularly consult the data collected to evaluate the effectiveness of DPR's pesticide safety regulatory programs and assess the need for changes. Taking illness data into consideration, DPR may adjust the restricted entry interval following pesticide application, specify buffer zones or other application conditions, or require pesticide handlers to use protective equipment that meets certain standards.

Every pesticide active ingredient has a pharmacologic effect by which it controls its target pest. Pesticide products may have other potentially harmful properties in addition to the qualities designed to control pests. Excessive exposure to pesticides may cause illness by various mechanisms. The Pesticide Illness Surveillance Program (PISP) collects information on adverse effects from any component of pesticide products including the active ingredients, inert ingredients, impurities, or breakdown products. Whether pesticide products act as irritants or as allergens, through their smell or by causing fires or explosions, DPR's mission is to mitigate exposures that compromise health.

Under a statute enacted in 1971 and amended in 1977 (now codified as Health and Safety Code Section 105200), California physicians are required to promptly report any suspected case of pesticide-related illness or injury by telephone to the local health officer. The health officer informs the county agricultural commissioner (CAC) and also completes a pesticide illness report, copies of which are distributed to the Office of Environmental Health Hazard Assessment, to the Department of Industrial Relations (DIR), and to DPR.

DPR strives to ensure that the PISP captures the majority of illness incidents. For example, since doctors do not always file the required illness reports, DPR's Worker Health and Safety Branch (WH&S) also reviews Doctors' First Reports of Worker Illness and Injury, which California's Labor Code requires workers' compensation insurers to forward to DIR. Staff select for investigation any report that mentions a pesticide, or pesticides in general, as a possible cause of injury. Reports that mention unspecified chemicals also are investigated if the setting is one in which pesticide use is likely. In typical years, this procedure identifies two-thirds to three-quarters of the incidents investigated.

The agricultural commissioner of the county where the incident occurred investigates every incident. DPR provides instructions, training, and technical support for conducting investigations. The instructions include directions for collecting appropriate samples to document environmental exposures. As part of the technical support, DPR maintains specialized laboratories to analyze the samples. The CACs prepare reports describing the circumstances in which pesticide exposure may have occurred and any other relevant aspects of the case. When appropriate, they request authorization from the affected people to include

relevant portions of their medical records with the report. If investigations identify other affected people, they are identified in the investigation report and reflected in the PISP database.

WH&S staff evaluate the physicians' reports and all the information the CACs have gathered, and classify incidents according to the circumstances of exposure to a pesticide. Staff undertake a complex task of determining the likelihood that a pesticide exposure caused the incident. Several factors complicate illness incident analysis. For one, the PISP evaluates adverse effects after the fact and often from secondary sources. Also, as explained above, illness incidents can occur from exposure to pesticide product components other than the active ingredient and may be unrelated to hazards predicted for the active ingredient. For instance, a documented allergic reaction to a pesticide would be recorded as a definite adverse effect, although it bears no relation to the way the pesticide acts on pests.

The PISP database provides the means to identify trends in pesticide-related illnesses warranting additional California restrictions and labeling modifications through the U.S. EPA's Label Improvement Program. Since many illness incidents result from illegal practices, ensuring compliance can improve work place safety. The PISP data allows state and county enforcement staff to prioritize inspections to significant non-compliance activities.

Efforts to Improve Reporting Compliance

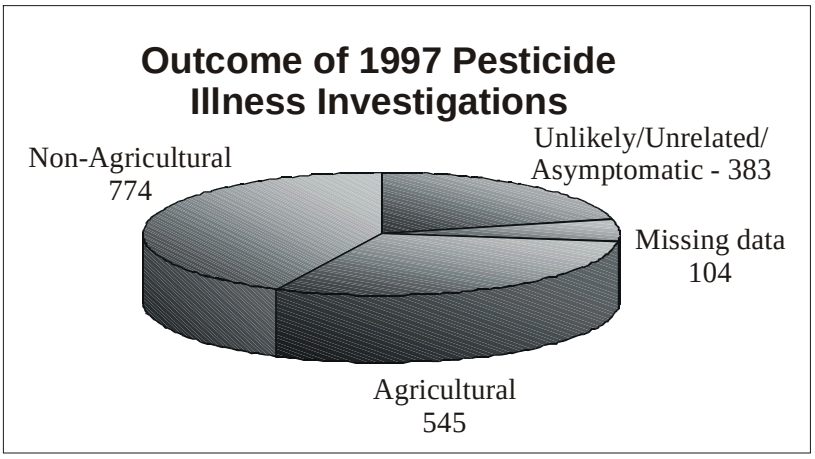
DPR continues to invest in efforts to increase physician reporting of pesticide adverse effects. Besides identifying cases that might escape detection otherwise, direct physician reporting allows DPR to investigate cases promptly, while the people involved remain accessible, with accurate recollection of the event. About half of all direct physician reports arrive within two weeks of the occurrence and nearly 90 percent within the month following exposure. By contrast, about three-quarters of the cases are more than a month old by the time they are located among doctors' reports to workers' compensation insurers.

DPR initiated an effort in 1994 to improve physician familiarity and compliance with the reporting requirement. DPR cooperated with DIR to send summaries of the reporting requirement to more than 70,000 physicians with active California licenses. DPR then followed up in 1995 and 1996 with individual correspondence to doctors who reported pesticide cases to workers' compensation insurers but not to their local health officers. This effort appears to have increased direct reporting noticeably. DPR continues to seek ways to expedite direct reporting while minimizing the burden on practitioners.

A pilot study in 1996 and 1997 demonstrated the feasibility of reporting through poison control centers. In 1997, DPR began working with the California Poison Control System to assist physicians in identifying and reporting cases appropriately. Confidentiality considerations prevent poison control centers from reporting cases on their own initiative, but they can offer to report on behalf of physicians who consult them.

1997 Numeric Results -- Totals

During 1997, DPR received reports of 1,806 people whose health may have been affected by pesticide exposure. After investigation, WH&S analysts found that pesticide exposure had been at least a possible contributing factor to 1,319 (73 percent) of the 1,806 cases. Of those 1,319 cases, 545 (41 percent) involved use of pesticides for agricultural purposes and 774 (59 percent) occurred in other settings. Evidence established a definite relationship to pesticide exposure for 261 of the cases. Another 631 were classified as probable, with 427 entered as possible. Tabular summaries presenting different aspects of the data are available through DPR's Web site at <www.cdpr.ca.gov>, or by contacting the WH&S.



The total number of cases identified as suggesting pesticide involvement declined by 423 (19 percent) relative to 1996. Physician reporting continued to improve in 1997. DPR received physician reports for 533 of 1,806 cases (30 percent) assigned for investigation in 1997. This compares to 566 of 2,229 (25 percent) in 1996, 529 of 2,401 (22 percent) in 1995 and 310 of 1,995 (16 percent) in 1994. Occupational exposures (those that occurred while the affected people were at work and eligible for workers' compensation) accounted for 1,607 (89 percent) of the 1,806 cases identified. A substantial number of the episodes derive from actions already

prohibited by pesticide safety regulations, which indicates that safety could be further improved through increased compliance efforts.

Agricultural Field Residue Incidents

In 1997, exposure to field residue was implicated in 208 cases (38 percent) of the 545 agriculturally related incidents. Of the 208 cases, DPR classified 105 as possible and 103 as definite or probable cases. Illegal reentry during the restricted entry interval contributed to 37 (18 percent) of the 208 cases. Group episodes in Imperial and Tulare Counties contributed 10 and 15 of the 37 cases, respectively.

The surveillance program identified an emerging hazard to field workers in the use of the insecticide cyfluthrin on oranges. In April 1997, a series of label changes culminated in allowing use of cyfluthrin on all citrus varieties and also reduced the pre-harvest interval from 150 to zero days, with a restricted entry interval of twelve hours. In May and June, three episodes generated a total of 62 reports of health complaints among harvesters of treated oranges. The affected workers, all from the same Tulare County packing company, reported symptoms predominantly of respiratory irritation. Several workers involved in the earliest episode were re-exposed and recorded in the database a second time. DPR and industry responded to the initial reports by cooperating in a voluntary stop harvest, limiting the potential outbreak.

During May 1997, DPR performed a pair of studies to measure respiratory exposure to harvesters of cyfluthrin-treated oranges. Study specifics are available in report HS-1765 (Edmiston et al., 1998). In May 1998, DPR initiated formal

reevaluation of all products containing cyfluthrin to address concerns about respiratory irritation raised by the illness reports.

Drift Exposure

Drift exposures continue to present problems. In 1997, drift was implicated in 131 episodes (56 involving agricultural use) that resulted in 211 occupational exposures and 67 non-occupational exposures. Drift from agricultural applications gave rise to 128 of the occupational exposures and 17 non-occupational exposures. Most drift episodes exposed only one person, and just four drift episodes gave rise to ten or more health complaints.

An aerial application of chlorpyrifos to alfalfa in Riverside County drifted onto a crew harvesting a neighboring melon field. In Imperial County, an application of benomyl and triadimefon to watermelons drifted onto a crew thinning asparagus in an adjacent field. In both these cases, the applicators were found to be at fault for making their applications with people so near. In Kern County, inspectors observed a violative episode as they verified that a farm labor contractor's crew complied with all safety regulations. The inspectors were preparing to leave when they noticed a tractor spraying the orchard where the inspected crew was working. The inspectors halted the application and sent the workers from the field. With the cooperation of the U. S. EPA, the Department of Justice brought charges against the grower. The grower eventually pleaded guilty, paid a fine of $1,000, and accepted a term on probation.

A widely reported 1997 episode also involved exposure via drift. It derived from the California Department of Fish and Game's (DFGs) use of the pesticide

rotenone to eliminate northern pike from Lake Davis in Plumas County. Local residents generally opposed the plan, but on October 15 and 16, 1997, DFG applied 64,000 pounds of a powdered formulation and 16,000 gallons of a liquid formulation to 49,000 acre-feet of water.

A number of community members went to observe the applications, and reports of adverse reactions to the pesticide began accumulating. On October 18, the Air Resources Board (ARB) emergency response team established six air monitoring sites near and around the lake. They analyzed samples for several pesticide components: rotenone, trichloroethylene (TCE), and aromatic hydrocarbons. (Both TCE and the aromatic hydrocarbons are solvents used in the rotenone formulations.) On October 20, 1997, DPR staff heard reports of illnesses from the Lake Davis treatment. In response to the reports, DPR instructed doctors' offices in Portola to report any illness associated with the pesticide application to the county health officer (as mandated by California Health and Safety Code Section 105200) and to the local CAC office.

From October 24 through November 15, 1997, PISP staff interviewed by telephone as many as possible of the people who reported health effects. To identify interviewees, staff consulted the CAC's office, ARB staff, and the DFG office as well as attempting to contact all the people identified in doctors' reports. Interviews were completed with 58 affected people, and information on nine children under age 16 was collected by interviewing their parents. Staff were unable to contact four people mentioned in doctors' reports. DPR received two additional reports months after the event.

The people interviewed reported experiencing eye irritation, upper respiratory irritation, and other non-specific systemic symptoms. Sixty individuals reported smelling an odor, most of whom smelled it within a mile of the lake. Descriptions of the odor ranged from "chemical smell," "very strong odor," or "extremely powerful odor" to more specific terms such as "creosote-like smell," "mothball-like odor," or "insecticide" odor.

Of the six air monitoring sites, five observed minimal levels of rotenone, TCE, and aromatic light hydrocarbons. Only the site at the spillway below the dam collected appreciable levels of pesticide components. There, rotenone was detected at very low levels (0.02 ppb) on October 18 and 19 and declined to non-detectable levels (< 0.001 ppb) by October 30. TCE was detected at the spillway only on October 18. Aromatic heavy hydrocarbon levels were the most significant detections: at the spillway, they were measured at 281 ppb on October 18 and 210 ppb on October 19, declining to 5.34 ppb on October 26, and to 1.61 ppb on November 1. ARB terminated monitoring on November 4, 1997, because all samples were below the limit of detection. Investigation of this episode is presented in report HS-1772 (Verder-Carlos and O'Malley, 1998).

Aromatic hydrocarbon exposure is known to cause mucous membrane irritation consistent with the symptoms experienced by individuals around Lake Davis. Based on the toxicology and air monitoring results for rotenone, trichloroethylene, and light hydrocarbons, there is no evidence to suggest that those components caused the symptoms or health effects described by the individuals around Lake Davis. Although measured concentrations did not reach levels expected to cause

irritation, the aromatic heavy hydrocarbons provide the most plausible explanation for the symptoms reported by the individuals around Lake Davis.

DPR has addressed the issue of drift through strict enforcement, policy development, electronic data management, and outreach to the pesticide applicator industry. DPR is working to improve incident/licensee identification, violation trends, statewide consistency in enforcement actions, and evaluation of user compliance. In 1997, DPR issued a Pesticide Drift Enforcement Policy which defines drift and summarizes the regulatory standards. An additional step is the development of a compliance database. Upon completion of this database, enforcement staff will be able to review compliance history when they consider renewal, refusal, or suspension of licenses. This database will enhance communication and add consistency to the overall enforcement decision-making process.

DPR also participated in an industry-sponsored program on drift reduction that integrates training on proper equipment use and calibration along with pilot decision-making to decrease drift, risk taking, and aerial accidents. In addition, drift control regulations now under development will expand the drift regulations to all types of applications, not just restricted material applications.

Morbidity and Mortality

Among the 892 cases evaluated after investigation as definitely or probably related to pesticide exposure, 18 people were hospitalized and 147 lost time from work. Of the 427 possible cases, two included hospitalization and 88 lost work time. Of three 1997 fatalities investigated, only one proved related to pesticide exposure. A

young, active woman died of methyl bromide poisoning when the fumigant diffused into the cottage she rented through forgotten conduit from an outbuilding on the property. Non-pesticide causes were identified for the other two deaths investigated.

Numerous mischances contributed to the methyl bromide fatality, including an infestation limited to the one room connected by conduit to the guest house, the departure of the earlier resident who installed the conduit, and placement of furniture in such a way as to hide the ends of the conduit. Investigation determined that the application had been performed in compliance with regulations, except for overlooking the open conduit hidden under a chair. The district attorney concluded that the oversight did not constitute criminal negligence and declined to file charges.

DPR is working with the Structural Pest Control Board to make regulatory changes that tighten the pre-fumigation inspection requirements for methyl bromide and other fumigants. Under the Board proposal, fumigators would have to evacuate and secure ancillary structures that are connected to the building to be fumigated.

Examples of the Importance of Compliance with Safety Procedures

Severe intoxications typically result from careless and often illegal use of pesticides. The following episodes came to DPR's attention during 1997. In each case, people used pesticides irresponsibly, jeopardizing their own health and others'.

Two Fresno County field workers became ill and were hospitalized overnight after drinking from an unlabeled container stored in a co-worker's automobile. The container, which originally had held windshield cleaning fluid, was in use at the time to carry water to replenish the vehicle's radiator. Investigation revealed that the container had been used previously to mix the highly toxic carbamate insecticide methomyl. A sample of the water was found to contain 400 milligrams of methomyl per liter. No enforcement action was taken, because investigators found no one able and willing to identify the owner of the car and container.

A Ventura County resident ignored two crucial label instructions in fogging an apartment. Label instructions directed use of one or two foggers for an apartment that size. Five or six apparently were used. Also, pilot lights were left burning, contrary to directions. The ensuing explosion tossed an upstairs tenant across his living room and blew out most of the windows in the eight-unit building, but no one was seriously injured. The building inspector declared the building structurally unsafe, and the Red Cross provided temporary shelter for 19 tenants.

In Santa Clara County, a 12-year-old boy did pyrotechnic experiments using insecticide that he found in the family garage. He sprayed some into an empty cottage cheese container and lit it on fire. The container melted and burned, and the boy's attempts to stamp out the fire resulted in leg burns that required two days' hospitalization. The identity of the insecticide he used could not subsequently be determined.

A two-year-old Los Angeles girl drank malathion that had been left in a sports bottle. Her father had received the pesticide from a friend for use on a home

garden. He could not account for his daughter's finding it. The child developed pulmonary edema and went into a coma, but recovered after three days in the hospital.

Contaminated feed killed 153 cows at a Kings County dairy. The cows started dying after eating a mixture of almond hulls and molasses. The veterinarian who examined the cattle found parts of bags of the organophosphate insecticide phorate in the feed. The dairy owner had used that insecticide two years earlier on cotton, and had inappropriately stored the remainder in a feed storage area.

Pesticides must be stored in secure areas, away from food and feed and inaccessible to children and untrained employees. Users must follow label directions carefully and literally. Pesticides must never be put into unlabeled containers, especially of types used for food or drink. Following these simple, obvious rules would go a long way towards avoiding the most severe toxic hazards.

Regulatory Responses to Illness Data Analysis

Review of illness data showed that fumigating tree-planting sites with methyl bromide caused a number of incidents including severe burns to applicators. From 1994 through 1996, 25 case reports were evaluated as definitely or probably related to methyl bromide exposure; and seven of these involved tree hole fumigators, including three whose injuries prevented them from working for a week or more. Six cases identified during 1997 were evaluated as definitely or probably related to methyl bromide exposure. One tree hole fumigator was disabled for seven days by his burns. Modification to application practices can reduce or eliminate tree hole

fumigation incidents. DPR is working with the applicators to evaluate mitigation measures, and expects to impose new requirements for safer delivery systems and techniques in 1999.

Based on preliminary review of episodes involving pesticide applicators, use of backpack sprayers appears to be another area of potential concern. DPR will undertake more extensive analysis of use patterns and health complaints to determine whether the situation warrants regulatory intervention.

DPR also has begun a more general new initiative, the Pesticide Workplace Evaluation Program. This program aims specifically to find ways to reduce the number of pesticide-related illnesses. DPR will train CAC enforcement staff in principles of industrial hygiene and occupational safety. This will equip them to take a broader view of safe pesticide use practices than they have had as enforcement agents. This initiative should provide new insights into the sources of pesticide-related illness and injury and new proposals for practical measures to control them.

Regulations requiring laboratories to report cholinesterase test results in standard units were approved in April 1999. Cholinesterase test results rarely provide useful information unless the clinician can compare results from the time of exposure to levels measured when the person had not been in contact with pesticides. At present, laboratories use such a variety of methods and procedures that tests done at one laboratory provide little guidance in determining whether another laboratory's test reflects a change from a person's normal status. The new regulations will not eliminate differences among laboratories, but should achieve

reasonable comparability among their results. Under the regulations, standardized reporting must begin by January 1, 2000.

References

GAO 1993. Pesticides on Farms: Limited capability exists to monitor occupational illnesses and injuries. Report to the Chairman, Committee on Agriculture, Nutrition, and Forestry, U.S. Senate GAO/PEMD-94-6.

Edmiston, S., J. Spencer, B. Hernandez and A.S. Frederickson. 1998. Inhalation exposure of orange harvesters to cyfluthrin residue. California Environmental Protection Agency, Department of Pesticide Regulation, Worker Health and Safety Branch, Report No. HS-1765.

Verder-Carlos, M. and M. O'Malley. 1998. A report on the illnesses related to the application of rotenone to Lake Davis. California Environmental Protection Agency, Department of Pesticide Regulation, Worker Health and Safety Branch, Report No. HS-1772.

TABLE 1
Summary of Illness/Injury Associated with Suspected Pesticide Exposure
Reported by California Physicians*
1997

Type of Illness	Adequate or Complete Data											Incomplete Data	
	Occupational					Non-Occupational					All Unrelated		
	Def[1]	Pro[2]	Pos[3]	Unl[4]	Ind[5]	Def[1]	Pro[2]	Pos[3]	Unl[4]	Ind[5]		Insufficient[6]	Unavailable[7]
Systemic	35	418	212	38	0	6	100	44	10	0	108	12	38
Eye	172	37	30	3	0	4	1	3	1	0	81	6	8
Skin	30	58	130	20	0	1	0	1	0	0	69	3	15
Eye/Skin	12	17	7	1	0	1	0	0	0	0	5	1	1
None/ND[8]	0	0	0	0	0	0	0	0	0	0	47	15	5
Subtotal	249	530	379	62	0	12	101	48	11	0	310	37	67
Total	**1220**					**172**					**310**	**104**	

* Source: California Department of Pesticide Regulation, Pesticide Illness Surveillance Program

[1] Def = Definitely related to pesticide exposure
[2] Pro = Probably related to pesticide exposure
[3] Pos = Possibly related to pesticide exposure
[4] Unl = Unlikely to be related to pesticide exposure
[5] Ind = Indirectly related to pesticide use
[6] Insufficient = The data collected was not adequate to make a determination on its causality to pesticides
[7] Unavailable = The information necessary to determine causality could not be collected (i.e., necessary witnesses or persons involved could not be located)
[8] None/ND - A relationship and/or illness type could not be determined from the information available

TABLE 2
Illnesses and Injuries Associated with Exposure to Pesticides Reported by Physicians in California
Summarized by Activity and Type of Illness/Injury
1997

ACTIVITY	ILLNESS/INJURY TYPE								Total	
	Systemic		Eye		Skin		Eye/Skin			
	Def/ Prob	Pos	Def/ Prob	Pos	Def/ Prob	Pos	Def/ Prob	Pos	Def/ Prob	Pos
Mixer/Loader, Aerial	0	0	1	0	1	2	0	0	2	2
Mixer/Loader, Ground	0	4	5	0	2	1	1	0	8	5
Mixer/Loader, Hand	18	4	62	0	10	0	3	0	93	4
Mixer/Loader, Unknown	0	0	0	0	1	0	0	0	1	0
Applicator, Ground	6	30	6	2	7	15	3	0	22	47
Applicator, Hand	14	13	33	6	13	19	3	0	63	38
Applicator, Other	32	16	57	2	25	18	1	2	115	38
Fumigation, Chamber	0	1	0	0	0	0	0	0	0	1
Fumigation, Field	1	1	0	0	2	0	0	0	3	1
Flagger	0	1	0	0	1	0	0	0	1	1
Exposed to Drift	150	37	10	1	3	6	4	0	167	44
Repair/Maintenance	15	0	10	0	4	2	2	0	31	2
Pack/Process (Commodity)	16	2	0	1	1	4	1	0	18	7
Exposed to Field Residue	83	44	4	12	8	45	8	4	103	105
Structural Residue	54	27	1	0	1	1	0	1	56	29
Other Residue	6	9	4	4	3	13	1	0	14	26
Manufacture/Formulation	1	2	1	0	0	1	0	0	2	3
Exposed to Concentrate	12	3	6	1	1	3	0	0	19	7
Emergency Response	8	6	0	0	0	0	0	0	8	6
Other	37	12	9	1	5	0	2	0	53	13
NON-OCCUPATIONAL- less fully reported than occupational cases										
Application	1	2	2	0	0	0	1	0	4	2
Exposed to Drift	49	14	1	2	0	1	0	0	50	17
Exposed to Residue	48	25	1	1	0	0	0	0	49	26
Other	8	3	1	0	1	0	0	0	10	3
TOTALS	**559**	**256**	**214**	**33**	**89**	**131**	**30**	**7**	**892**	**427**

TABLE 4
Illnesses/Injuries with Confirmed Relationship to Pesticide Exposure
Summarized by Pesticide(s), Type of Illness and Degree of Relationship
1997

PESTICIDE	SYSTEMIC		EYE		SKIN		EYE & SKIN		TOTAL	
	Definite/ Probable	Possible	Definite/ Probable	Possible	Definite/ Probable	Possible	Definite/ Probable	Possible	Definite/ Probable	Possible
Abamectin	0	2	2	0	0	0	0	0	2	2
Acephate	0	1	0	1	0	0	0	0	0	2
Acrolein	1	0	0	0	0	0	0	0	1	0
Adjuvant	0	0	0	0	0	1	0	0	0	1
Aldicarb	0	2	0	0	0	0	0	0	0	2
Allethrin	0	0	0	0	0	1	0	0	0	1
Aluminum Phosphide	9	2	0	0	0	0	0	0	9	2
Amitraz	0	0	1	0	0	0	0	0	1	0
Bacillus Thuringiensis	0	0	0	0	0	1	0	0	0	1
Benomyl	0	0	0	1	0	0	0	0	0	1
Bensulide	2	1	0	0	0	0	0	0	2	1
Bifenthrin	0	0	0	0	0	1	0	0	0	1
Borax	0	0	0	0	0	0	0	1	0	1
Boric Acid	1	0	1	0	0	0	0	0	2	0
Bromoxynil	2	0	0	0	0	0	0	0	2	0
Butylate	0	1	0	0	0	0	0	0	0	1
Calcium Hypochlorite	4	2	5	0	1	0	0	0	10	2
Captan	0	1	0	0	0	0	0	0	0	1
Carbaryl	2	0	0	0	0	2	0	0	2	2
Chlorine	13	3	1	0	0	0	0	0	14	3
Chlorine Dioxide	4	1	0	0	0	0	0	0	4	1
Chlorothalonil	0	1	1	0	1	0	0	0	2	1
Chlorpyrifos	44	14	5	0	0	1	1	0	50	15
Citric Acid	0	0	1	0	0	0	0	0	1	0
Citronella	0	0	0	0	0	1	0	0	0	1
Copper Hydroxide	0	1	0	1	0	0	0	0	0	2

TABLE 4 (continued)
Illnesses/Injuries with Confirmed Relationship to Pesticide Exposure
Summarized by Pesticide(s), Type of Illness and Degree of Relationship
1997

PESTICIDE	SYSTEMIC		EYE		SKIN		EYE & SKIN		TOTAL	
	Definite/ Probable	Possible	Definite/ Probable	Possible	Definite/ Probable	Possible	Definite/ Probable	Possible	Definite/ Probable	Possible
Copper Naphthenate	0	0	0	0	0	1	0	0	0	1
Copper Sulfate	0	0	3	1	0	0	0	0	3	1
Creosote	1	1	0	0	1	0	0	0	2	1
Cryolite	0	0	0	0	0	0	1	0	1	0
Cyanuric Acid	0	1	6	0	4	1	0	0	10	2
Cycloate	0	0	0	0	0	1	0	0	0	1
Cyfluthrin	60	5	1	0	0	4	3	0	64	9
Cypermethrin	1	0	2	0	2	0	0	0	5	0
Dazomet	0	0	0	0	0	1	0	0	0	1
DDVP	2	5	0	0	0	0	0	0	2	5
Deet	0	0	2	0	0	0	0	0	2	0
Diazinon	14	7	0	1	1	0	0	0	15	8
Dicofol	0	2	1	0	0	1	0	0	1	3
Dimethoate	1	1	0	0	0	0	0	0	1	1
Diphacinone	0	1	0	0	0	0	0	0	0	1
Diquat	1	0	0	0	0	1	0	0	1	1
Disodium Octaborate Tetrahydrate	0	1	0	0	0	0	0	0	0	1
Disulfoton	0	1	0	0	0	0	0	0	0	1
Dithiopyr	0	2	0	0	0	0	0	0	0	2
Diuron	0	1	0	0	0	0	0	0	0	1
Esfenvalerate	2	2	1	0	0	0	0	0	3	2
Ethyl Alcohol	0	1	0	0	0	0	0	0	0	1
Fenthion	1	0	0	0	0	0	0	0	1	0
Fluazifop-Butyl	0	0	0	0	0	1	0	0	0	1
Fluvalinate	1	0	0	0	0	0	0	0	1	0
Fonofos	1	0	0	0	0	0	0	0	1	0
Formaldehyde	2	1	1	0	0	0	0	0	3	1
Glutaraldehyde	6	1	5	0	1	0	0	0	12	1

TABLE 4 (continued)
Illnesses/Injuries with Confirmed Relationship to Pesticide Exposure
Summarized by Pesticide(s), Type of Illness and Degree of Relationship
1997

PESTICIDE	SYSTEMIC		EYE		SKIN		EYE & SKIN		**TOTAL**	
	Definite/ Probable	Possible	Definite/ Probable	Possible	Definite/ Probable	Possible	Definite/ Probable	Possible	Definite/ Probable	Possible
Glyphosate	0	4	5	2	6	4	0	0	11	10
Halogenated Hydantoins	0	1	0	0	0	0	0	0	0	1
Hydrogen Chloride	2	1	0	0	1	0	0	0	3	1
Hydrogen Cyanamide	1	0	0	0	0	0	0	0	1	0
Indole-3-Butyric Acid	0	0	0	1	0	0	0	0	0	1
Iprodione	0	3	0	2	0	0	1	0	1	5
K Salts Of Fatty Acids	0	1	0	0	0	0	0	0	0	1
Kathon	0	0	0	0	1	0	0	0	1	0
Lindane	0	0	1	0	0	0	0	0	1	0
Linuron	0	0	0	0	0	1	0	0	0	1
Malathion	33	4	0	0	0	1	1	0	34	5
Mancozeb	0	0	0	0	0	1	0	0	0	1
Mepiquat Chloride	0	1	0	0	0	0	0	0	0	1
Metalaxyl	1	0	0	0	0	0	0	0	1	0
Metam-Sodium	10	0	0	0	6	3	1	0	17	3
Methamidophos	3	0	0	0	0	0	0	0	3	0
Methidathion	0	1	0	0	0	0	0	0	0	1
Methomyl	2	1	3	0	0	0	1	0	6	1
Methyl Bromide	2	1	0	0	1	0	0	0	3	1
Metolachlor	0	0	1	0	0	0	0	0	1	0
Myclobutanil	0	1	0	0	1	0	0	0	1	1
Naled	1	1	0	0	0	0	0	0	1	1
Napropamide	0	0	1	0	0	0	0	0	1	0
Nonanoic Acid	0	0	0	0	1	0	0	0	1	0
Oxadiazon	2	0	0	0	0	0	0	0	2	0
Oxyfluorfen	8	1	0	0	0	0	0	0	8	1
Oxytetracycline	0	0	0	0	1	0	0	0	1	0

TABLE 4 (continued)
Illnesses/Injuries with Confirmed Relationship to Pesticide Exposure
Summarized by Pesticide(s), Type of Illness and Degree of Relationship
1997

PESTICIDE	SYSTEMIC		EYE		SKIN		EYE & SKIN		**TOTAL**	
	Definite/ Probable	Possible	Definite/ Probable	Possible	Definite/ Probable	Possible	Definite/ Probable	Possible	Definite/ Probable	Possible
Paraquat	0	0	1	0	1	3	0	0	2	3
PCNB	0	0	0	0	0	1	0	0	0	1
Permethrin	2	2	1	0	0	0	0	0	3	2
Peroxyacetic Acid	6	4	0	0	2	0	0	0	8	4
Petroleum Oil	0	1	0	0	0	0	0	0	0	1
Phenolic Disinfectants	2	4	3	0	3	0	2	0	10	4
Phorate	1	0	0	0	0	0	0	0	1	0
Phosmet	0	1	0	0	0	1	0	0	0	2
Pine Oil	2	0	1	0	0	0	0	0	3	0
Potassium Hydroxide	0	0	0	0	1	0	0	0	1	0
Prometon	0	1	0	0	0	0	0	0	0	1
Propargite	5	0	0	0	2	2	0	0	7	2
Propetamphos	14	0	0	0	0	0	0	0	14	0
Propiconazole	1	1	0	0	0	0	0	0	1	1
Propoxur	1	0	0	0	0	0	0	0	1	0
Quaternary Ammonia	6	3	50	1	10	4	0	1	66	9
Resmethrin	2	0	1	1	0	0	0	0	3	1
Rotenone	53	8	0	0	0	1	0	0	53	9
Sethoxydim	0	0	0	0	1	1	0	0	1	1
Sodium Chlorite	0	2	0	1	0	0	0	0	0	3
Sodium Hypochlorite	55	9	75	1	14	14	6	0	150	24
Sodium Tetrathiocarbonate	0	1	0	0	0	0	0	0	0	1
Streptomycin	8	0	0	0	2	0	1	0	11	0
Strychnine	0	1	0	0	0	0	0	0	0	1
Sulfur	7	11	3	8	5	9	9	2	24	30
Sulfur Dioxide	2	0	0	0	0	1	0	0	2	1
Sulfuryl Fluoride	0	3	0	0	0	0	0	0	0	3

TABLE 4 (continued)
Illnesses/Injuries with Confirmed Relationship to Pesticide Exposure
Summarized by Pesticide(s), Type of Illness and Degree of Relationship
1997

PESTICIDE	SYSTEMIC		EYE		SKIN		EYE & SKIN		**TOTAL**	
	Definite/ Probable	Possible	Definite/ Probable	Possible	Definite/ Probable	Possible	Definite/ Probable	Possible	Definite/ Probable	Possible
Thiobencarb	0	1	0	0	0	0	0	0	0	1
Thiram	0	0	0	1	0	0	0	0	0	1
Tralomethrin	1	0	0	0	0	0	0	0	1	0
Triadimefon	0	1	0	0	0	0	0	0	0	1
Trichlorfon	1	0	0	0	0	0	0	0	1	0
Trichloromelamine	0	0	0	0	1	0	0	0	1	0
Triclopyr	0	2	0	0	0	0	0	0	0	2
Trifluralin	0	1	0	1	0	1	0	0	0	3
Trinexapac-Ethyl	0	0	0	0	0	1	0	0	0	1
Unknown	0	1	0	0	0	0	0	0	0	1
Zinc Phosphide	0	1	0	0	0	0	0	0	0	1
Ziram	1	0	0	0	0	0	0	0	1	0
Combinations of Insecticides Including Cholinesterase Inhibitor(S)	46	32	3	1	3	8	1	2	53	43
Combinations of Insecticides other than Cholinesterase Inhibitors	17	16	2	0	2	2	0	1	21	19
Combinations of Herbicides/Defoliants	3	13	3	0	5	8	1	0	12	21
Combinations of Fungicides	29	5	0	1	0	10	0	0	29	16
Combinations of Fumigants	2	4	0	0	1	0	1	0	4	4
Combinations of Antimicrobials	26	1	13	1	2	3	0	0	41	5
Miscellaneous Combinations	14	26	4	3	3	26	0	0	21	55
Unknown Pesticides	12	14	4	3	2	6	0	0	18	23
TOTAL	**559**	**256**	**214**	**33**	**89**	**131**	**30**	**7**	**892**	**427**

TABLE 5
Summary of Illness/Injury Incidents
Reported by Physicians According to County of Occurrence
1997

COUNTY Relationship	TOTAL CASES	Type of Exposure*			Type of Use	
		Pesticide Concentrate[1]	Pesticide Use[2]	Pesticide Residue[3]	Agricultural	Non-Agricultural
ALAMEDA						
Definite	3	0	2	0	0	3
Probable	8	0	4	2	0	8
Possible	8	2	3	1	0	8
Unrelated	10					
Insufficient	5					
Unavailable	1					
AMADOR						
Unrelated	1					
BUTTE						
Definite	2	0	1	0	1	1
Probable	1	0	1	0	1	0
Possible	1	0	1	0	0	1
Unlikely	1	0	0	1	1	0
Asymptomatic	1	0	0	0	1	0
Unrelated	2					
COLUSA						
Definite	3	0	3	0	3	0
Probable	10	0	0	10	0	10
Possible	2	0	1	0	2	0
Asymptomatic	4	0	0	4	0	4
CONTRA COSTA						
Definite	2	0	1	0	0	2
Probable	9	1	6	2	0	9
Possible	4	0	1	3	0	4
Unrelated	5					
DEL NORTE						
Possible	1	0	0	1	1	0
Unrelated	3					
EL DORADO						
Definite	1	0	0	1	0	1
Possible	2	0	1	1	0	2
Unrelated	1					
FRESNO						
Definite	22	0	15	1	7	15
Probable	18	1	14	1	10	8
Possible	51	1	30	18	38	13
Unlikely	4	0	2	2	3	1
Unrelated	19					
Insufficient	5					
Unavailable	4					

TABLE 5 (continued)
Summary of Illness/Injury Incidents
Reported by Physicians According to County of Occurrence
1997

COUNTY Relationship	TOTAL CASES	Type of Exposure*			Type of Use	
		Pesticide Concentrate[1]	Pesticide Use[2]	Pesticide Residue[3]	Agricultural	Non-Agricultural
GLENN						
Definite	1	0	1	0	0	1
Possible	2	0	0	2	2	0
Unrelated	3					
HUMBOLDT						
Probable	1	0	1	0	0	1
Possible	4	0	3	1	1	3
Unlikely	1	0	0	1	0	1
Unrelated	2					
Unavailable	2					
IMPERIAL						
Probable	36	0	20	9	34	2
Possible	3	0	0	2	3	0
Unlikely	3	0	1	1	2	1
Asymptomatic	7	0	0	7	7	0
Unrelated	9					
Insufficient	2					
Unavailable	2					
KERN						
Definite	10	0	7	0	4	6
Probable	37	0	22	10	32	5
Possible	47	3	17	25	40	7
Unlikely	6	0	3	3	5	1
Asymptomatic	3	0	2	0	2	1
Unrelated	11					
Insufficient	1					
Unavailable	4					
KINGS						
Definite	3	0	3	0	2	1
Probable	13	0	12	1	9	4
Possible	4	0	1	3	4	0
Unlikely	1	0	1	0	1	0
Unrelated	8					
Insufficient	1					
Unavailable	3					
LAKE						
Probable	1	1	0	0	0	1
Possible	3	0	3	0	3	0
Unrelated	1					
Unavailable	1					

TABLE 5 (continued)
Summary of Illness/Injury Incidents
Reported by Physicians According to County of Occurrence
1997

COUNTY Relationship	TOTAL CASES	Type of Exposure*			Type of Use	
		Pesticide Concentrate[1]	Pesticide Use[2]	Pesticide Residue[3]	Agricultural	Non-Agricultural
LOS ANGELES						
Definite	49	4	37	1	0	49
Probable	50	5	24	16	1	49
Possible	26	1	13	10	4	22
Unlikely	1	0	1	0	0	1
Unrelated	36					
Insufficient	3					
Unavailable	7					
MADERA						
Definite	5	0	3	1	4	1
Probable	10	0	7	3	4	6
Possible	3	0	0	3	2	1
Unlikely	2	0	1	1	2	0
Unrelated	6					
MARIN						
Definite	3	0	2	1	0	3
Probable	3	0	1	1	0	3
Unrelated	2					
MARIPOSA						
Definite	1	0	0	0	0	1
MENDOCINO						
Unrelated	1					
MERCED						
Definite	6	0	5	1	3	3
Probable	18	0	6	12	5	13
Possible	7	0	3	2	7	0
Unlikely	3	0	2	0	2	1
Unrelated	11					
Insufficient	3					
MODOC						
Unrelated	1					
MONTEREY						
Definite	5	0	5	0	1	4
Probable	8	0	5	2	6	2
Possible	28	0	8	20	25	3
Unlikely	3	0	1	2	3	0
Asymptomatic	2	0	1	1	2	0
Unrelated	4					
Unavailable	3					

TABLE 5 (continued)
Summary of Illness/Injury Incidents
Reported by Physicians According to County of Occurrence
1997

COUNTY Relationship	TOTAL CASES	Type of Exposure*			Type of Use	
		Pesticide Concentrate[1]	Pesticide Use[2]	Pesticide Residue[3]	Agricultural	Non-Agricultural
NAPA						
Definite	4	0	3	0	2	2
Probable	10	0	3	4	0	10
Possible	1	0	0	1	1	0
Unrelated	1					
NEVADA						
Definite	1	0	1	0	0	1
Possible	1	0	1	0	0	1
ORANGE						
Definite	14	0	12	2	0	14
Probable	24	0	13	4	0	24
Possible	10	0	4	2	0	10
Unlikely	1	0	1	0	0	1
Unrelated	14					
Insufficient	1					
Unavailable	5					
PLACER						
Definite	3	1	1	1	0	3
Asymptomatic	1	1	0	0	0	1
PLUMAS						
Probable	53	0	4	0	0	53
Possible	9	0	0	0	0	9
Unlikely	6	0	1	0	0	6
Unrelated	1					
Unavailable	3					
RIVERSIDE						
Definite	6	0	6	0	0	6
Probable	42	2	32	7	31	11
Possible	11	1	6	4	7	4
Unlikely	3	0	1	1	0	3
Asymptomatic	5	0	5	0	4	1
Unrelated	6					
Insufficient	1					
Unavailable	3					

TABLE 5 (continued)
Summary of Illness/Injury Incidents
Reported by Physicians According to County of Occurrence
1997

COUNTY Relationship	TOTAL CASES	Type of Exposure*			Type of Use	
		Pesticide Concentrate[1]	Pesticide Use[2]	Pesticide Residue[3]	Agricultural	Non-Agricultural
SACRAMENTO						
Definite	13	0	12	1	3	10
Probable	11	0	8	2	1	10
Possible	9	0	5	4	2	7
Unlikely	1	0	0	0	0	1
Asymptomatic	1	1	0	0	0	1
Unrelated	7					
Insufficient	2					
Unavailable	3					
SAN BENITO						
Definite	8	0	0	8	8	0
Probable	4	0	3	0	3	1
Possible	2	0	0	1	1	1
Unlikely	3	0	0	2	2	1
Asymptomatic	2	0	0	2	2	0
Unrelated	2					
SAN BERNARDINO						
Definite	5	0	5	0	1	4
Probable	44	2	13	3	1	43
Possible	5	0	4	1	0	5
Asymptomatic	1	0	1	0	0	1
Unrelated	12					
Insufficient	1					
Unavailable	1					
SAN DIEGO						
Definite	22	0	19	3	1	21
Probable	21	2	11	6	0	21
Possible	32	5	8	6	3	29
Unlikely	3	0	0	2	0	3
Asymptomatic	1	0	1	0	0	1
Unrelated	13					
Insufficient	2					
Unavailable	8					
SAN FRANCISCO						
Definite	4	0	3	1	0	4
Probable	11	3	6	1	0	11
Possible	2	0	2	0	0	2
Unrelated	5					
Insufficient	1					
Unavailable	3					

TABLE 5 (continued)
Summary of Illness/Injury Incidents
Reported by Physicians According to County of Occurrence
1997

COUNTY Relationship	TOTAL CASES	Type of Exposure*			Type of Use	
		Pesticide Concentrate[1]	Pesticide Use[2]	Pesticide Residue[3]	Agricultural	Non-Agricultural
SAN JOAQUIN						
Definite	7	0	7	0	4	3
Probable	9	1	5	2	2	7
Possible	10	0	7	3	7	3
Unlikely	5	0	3	2	5	0
Unrelated	12					
Insufficient	2					
Unavailable	1					
SAN LUIS OBISPO						
Definite	2	0	2	0	1	1
Probable	6	0	4	2	2	4
Possible	2	0	0	1	1	1
SAN MATEO						
Definite	5	0	4	0	0	5
Probable	6	1	4	1	0	6
Possible	5	0	1	3	2	3
Unlikely	2	0	1	0	0	2
Unrelated	9					
Insufficient	2					
Unavailable	3					
SANTA BARBARA						
Definite	1	0	0	1	1	0
Probable	2	0	1	1	1	1
Possible	6	0	1	0	2	4
Unlikely	5	0	1	3	3	2
Asymptomatic	1	0	1	0	1	0
Unrelated	2					
SANTA CLARA						
Definite	22	0	17	2	2	20
Probable	13	0	8	3	1	12
Possible	17	0	11	3	4	13
Unlikely	3	0	0	2	0	3
Asymptomatic	1	0	1	0	0	1
Unrelated	8					
Insufficient	1					
Unavailable	5					
SANTA CRUZ						
Definite	2	0	2	0	2	0
Probable	4	0	2	0	2	2
Possible	11	0	5	4	8	3
Asymptomatic	1	0	1	0	1	0

TABLE 5 (continued)
Summary of Illness/Injury Incidents
Reported by Physicians According to County of Occurrence
1997

COUNTY Relationship	TOTAL CASES	Type of Exposure*			Type of Use	
		Pesticide Concentrate[1]	Pesticide Use[2]	Pesticide Residue[3]	Agricultural	Non-Agricultural
SHASTA						
Probable	3	0	2	1	0	3
Possible	2	0	1	1	0	2
Unrelated	1					
SISKIYOU						
Probable	1	0	1	0	0	1
SOLANO						
Definite	3	0	3	0	1	2
Probable	10	0	6	4	2	8
Possible	5	1	3	1	1	4
Unrelated	3					
Insufficient	1					
Unavailable	1					
SONOMA						
Definite	4	0	4	0	0	4
Probable	6	1	4	0	2	4
Possible	18	0	8	6	11	7
Unlikely	3	0	2	1	3	0
Unrelated	11					
STANISLAUS						
Definite	4	0	3	1	2	2
Probable	13	1	10	2	3	10
Possible	20	1	8	10	9	11
Unlikely	7	0	6	1	7	0
Asymptomatic	1	0	0	1	1	0
Unrelated	14					
Unavailable	1					
SUTTER						
Probable	4	0	0	4	4	0
Unrelated	1					
Insufficient	1					
TULARE						
Definite	11	1	6	3	2	9
Probable	101	0	10	72	98	3
Possible	32	1	15	16	30	2
Unlikely	4	0	3	1	3	1
Asymptomatic	4	0	0	4	4	0
Unrelated	5					
Insufficient	1					
Unavailable	1					
TUOLUMNE						
Definite	2	0	2	0	0	2

TABLE 5 (continued)
Summary of Illness/Injury Incidents
Reported by Physicians According to County of Occurrence
1997

COUNTY Relationship	TOTAL CASES	Type of Exposure*			Type of Use	
		Pesticide Concentrate[1]	Pesticide Use[2]	Pesticide Residue[3]	Agricultural	Non-Agricultural
VENTURA						
Definite	2	0	2	0	0	2
Probable	6	1	1	4	4	2
Possible	7	0	4	3	4	3
Unlikely	1	0	1	0	1	0
Unrelated	2					
Insufficient	0					
Unavailable	1					
YOLO						
Probable	4	1	2	1	1	3
Possible	11	0	2	4	4	7
Unlikely	1	0	1	0	0	1
Asymptomatic	1	0	0	0	0	1
Unrelated	2					
Insufficient	1					
Unavailable	1					
YUBA						
Possible	3	0	0	3	1	2
TOTALS:						
Definite	**261**	**6**	**199**	**29**	**55**	**206**
Probable	**631**	**23**	**276**	**193**	**260**	**371**
Possible	**427**	**16**	**181**	**169**	**230**	**197**
Unlikely	**73**	**0**	**33**	**26**	**43**	**30**
Indirect	**0**	**0**	**0**	**0**	**0**	**0**
Asymptomatic	**43**	**8**	**13**	**19**	**25**	**18**
Unrelated	**267**					
Insufficient	**37**					
Unavailable	**67**					
Overall	**1806**	**53**	**702**	**436**	**613**	**822**

* Type of exposure is determined by activity of affected person at the time of exposure. If the activity of affected people could not be adequately described by one of the categories listed below, those episodes are not included in any type of exposure column, and the sum of the columns is less than the total cases.

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[1] Exposure to concentrate includes exposure incurred in the process of manufacture, formulation, response to emergencies, or while handling pesticide containers in the course of shipping, warehousing or retailing.

[2] Exposure via pesticide use includes exposures to mixers, loaders, applicators, flaggers, fumigators and people exposed to drift.

[3] Exposure to pesticide residue includes residues in the field, on commodities being packed or processed, on equipment being serviced, resulting from structural applications or any other residue encountered in the course of employment.

TABLE 6
Number of Cases Classified as Systemic
by Types of Symptoms Reported and Degree of Relationship
1997

Symptomatology Reported	Probability of Relationship			Total
	Definite	Probable	Possible	
Respiratory & Other Systemic				
including topical (eye and/or skin)	4	112	30	146
without topical effects	9	140	60	209
Systemic but not Respiratory				
including topical effects	2	49	32	83
without topical effects	14	101	89	204
Respiratory Effects				
including topical effects	8	52	13	73
without topical effects	4	4	32	100
TOTAL	**41**	**518**	**256**	**815**

TABLE 8

Age Distribution of Cases Definitely, Probably or Possibly Related to Exposure to Pesticides Other than Antimicrobial 1997

Age Group	Agricultural			Non-Agricultural		
	Male	Female	Unknown	Male	Female	Unknown
Age Unknown	11	2	0	10	22	1
< 10 years	2	2	0	6	18	0
10 - 14.9	1	1	0	7	7	0
15 - 19.9	25	6	0	11	6	0
20 - 29.9	138	25	0	39	23	0
30 - 39.9	117	36	0	54	27	0
40 - 49.9	64	23	0	29	53	0
50 - 59.9	32	10	0	19	24	0
60 + years	12	3	0	15	17	0
Total	**402**	**108**	**0**	**190**	**197**	**1**

Age Distribution of Cases Definitely, Probably or Possibly Related to Exposure to Antimicrobial Pesticides 1997

Age Group	Agricultural			Non-Agricultural		
	Male	Female	Unknown	Male	Female	Unknown
Age Unknown	0	0	0	4	6	0
<10 years	0	0	0	0	0	0
10 - 14.9	0	0	0	0	0	0
15 - 19.9	0	0	0	16	13	0
20 - 29.9	11	2	0	75	54	0
30 - 39.9	7	5	0	50	47	0
40 - 49.9	2	3	0	29	52	0
50 - 59.9	1	2	0	15	17	0
60 + years	1	1	0	5	3	0
Total	**22**	**13**	**0**	**194**	**192**	**0**

TABLE 9
Classification of Cases
By Symptom Type and Pesticide Type
1997

Pesticide Type	Eye Symptoms Only				
	Definite	**Probable**	**Possible**	**Unlikely**	**Indirect**
Antimicrobials	145	21	6	0	0
Cholinesterase Inhibitors	7	6	5	1	0
Other Pesticides	24	11	22	3	0
	Skin Symptoms, With or Without Eye Involvement				
Antimicrobials	19	32	25	4	0
Cholinesterase Inhibitors	3	7	26	6	0
Other Pesticides	22	36	87	11	0
	Systemic or Respiratory Symptoms With or Without Eye or Skin Involvement				
Antimicrobials	19	114	40	2	0
Cholinesterase Inhibitors	9	171	84	8	0
Other Pesticides	13	233	132	38	0

Pesticide Type	Unclassified Cases	
	Insufficient	**Unavailable**
Antimicrobials	17	25
Cholinesterase Inhibitors	7	6
Other Pesticides	13	36

Pesticide Type	Asymptomatic Cases
Antimicrobials	5
Cholinesterase Inhibitors	18
Other Pesticides	20

TABLE 3A
Hospitalization and Disability Associated with
Illnesses/Injuries Definitely or Probably Related to Pesticide Exposure
1997

ACTIVITY	TOTAL CASES	HOSPITALIZATION				DISABILITY			
		Number of Cases			Total Days Reported	Number of Cases			Total Days Reported
		Unk[1]	Indef[2]	Rep[3]		Unk[1]	Indef[2]	Rep[3]	
Mixer/Loader, Aerial	2	0	0	0	0	0	0	1	21
Mixer/Loader, Ground	8	0	0	0	0	1	0	3	4
Mixer/Loader, Hand	93	0	0	0	0	1	0	18	43
Mixer/Loader, Unknown	1	0	0	0	0	0	0	0	0
Applicator, Ground	22	0	0	1	2	1	0	3	29
Applicator, Hand	63	0	0	1	7	1	0	8	28
Applicator, Other	115	0	0	0	0	1	1	23	67
Fumigation, Field	3	0	0	0	0	0	0	2	19
Flagger	1	0	0	0	0	0	0	0	0
Exposed to Drift	167	0	0	0	0	11	0	21	87
Repair/Maintenance	31	0	0	0	0	0	0	4	13
Pack/Process (Commodity)	18	0	0	0	0	0	0	6	9
Exposed to Field Residue	103	0	0	4	8	0	0	13	57
Structural Residue	56	0	0	0	0	5	0	19	61
Other Residue	14	0	0	0	0	0	0	2	5
Manufacture/Formulation	2	0	0	0	0	1	0	0	0
Exposed to Concentrate	19	0	0	0	0	1	0	2	3
Emergency Response	8	0	0	0	0	1	0	0	0
Other	53	1	0	3	4	4	0	19	57
NON-OCCUPATIONAL- less fully reported than occupational cases									
Application	4	0	0	1	8	0	0	0	0
Exposed to Drift	50	0	0	3	19	4	0	0	0
Exposed to Residue	49	0	0	0	0	4	0	2	6
Other	10	0	0	5	16	3	0	0	0
Total Prob and Def Cases	**892**	**1**	**0**	**18**	**64**	**39**	**1**	**146**	**509**

[1] Unknown whether hospitalization/disability occurred or not

[2] Duration of hospitalization/disability not reported.

[3] Duration of hospitalization/disability reported as one or more days.

TABLE 3B
Hospitalization and Disability Associated with
Illnesses/Injuries Possibly Related to Pesticide Exposure
1997

ACTIVITY	TOTAL CASES	HOSPITALIZATION				DISABILITY			
		Number of Cases			Total Days Reported	Number of Cases			Total Days Reported
		Unk[1]	Indef[2]	Rep[3]		Unk[1]	Indef[2]	Rep[3]	
Mixer/Loader, Aerial	2	0	0	0	0	0	0	1	3
Mixer/Loader, Ground	5	0	0	0	0	1	0	1	1
Mixer/Loader, Hand	4	0	0	0	0	0	0	2	3
Applicator, Ground	47	0	0	0	0	3	0	12	68
Applicator, Hand	38	0	0	1	1	1	0	7	16
Applicator, Other	38	0	0	0	0	2	0	8	99
Fumigation, Chamber	1	0	0	0	0	0	0	0	0
Fumigation, Field	1	0	0	0	0	0	0	0	0
Flagger	1	0	0	0	0	0	0	1	3
Exposed to Drift	44	0	0	0	0	1	0	12	38
Repair/Maintenance	2	0	0	0	0	1	0	0	0
Pack/Process (Commodity)	7	0	0	0	0	0	0	0	0
Exposed to Field Residue	105	0	0	0	0	4	1	23	95
Structural Residue	29	0	0	0	0	3	0	7	15
Other Residue	26	0	0	1	3	2	0	4	7
Manufacture/Formulation	3	0	0	0	0	1	0	2	7
Exposed to Concentrate	7	0	0	0	0	0	0	1	9
Emergency Response	6	0	0	0	0	0	0	0	0
Other	13	0	0	0	0	1	0	3	7
NON-OCCUPATIONAL- less fully reported than occupational cases									
Application	2	0	0	0	0	0	0	0	0
Exposed to Drift	17	0	0	0	0	2	0	1	15
Exposed to Residue	26	0	0	0	0	0	1	1	4
Other	3	0	0	0	0	0	0	0	0
Total Possible Cases	**427**	**0**	**0**	**2**	**4**	**22**	**2**	**86**	**390**

[1] Unknown whether hospitalization/disability occurred or not

[2] Duration of hospitalization/disability not reported.

[3] Duration of hospitalization/disability reported as one or more days.

TABLE 7
Pesticide-Associated Skin Disease
Among Field Workers
1982 – 1997

Year	Definite or Probable	Possible
1982	32	105
1983	28	77
1984	45	99
1985	154	146
1986	148	56
1987	51	139
1988	62	186
1989	7	77
1990	8	98
1991	2	64
1992	16	94
1993	1	51
1994	5	37
1995	74	74
1996	12	55
1997	8	45

* Evaluation of field worker dermatitis became more conservative in 1987, following a 1986 study that demonstrated the difficulty of collecting reliable information.